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A. Relevance of the Above-identified Document

The following is a partial English translation of exemplary portions of non-English language information that may be relevant to the present invention.

B. Translation of the Relevant Passages of the Document

See also the attached English Abstract.

[CLAIMS]

1. A catalyst structure for causing a photo-catalytic reaction by simultaneously distributing a reaction gas therein and irradiating light thereto,

said catalyst structure, comprising:

a three dimensional grid structure, in which the reaction gas and the light are distributed,

said catalyst structure being a structure in which an activated carbon and a photocatalyst active ingredient are supported by at least one base selected from a group consisting of metals, ceramics, and carbons.

2. The catalyst structure as set forth in claim 1, wherein:

a total of the activated carbon and the photocatalyst active ingredient falls within a range from 5 % by weight

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to 50 % by weight with respect to the catalyst structure, and

in cases where the photocatalyst active ingredient is an oxide, a weight ratio of the photocatalyst active ingredient to the activated carbon is 1 or less, and

in cases where the photocatalyst active ingredient is a metal, a weight ratio of the photocatalyst active ingredient to the activated carbon is 0.1 or less.

3. A method for producing the catalyst structure as set forth in claim 1, comprising:

a step of coating the three dimensional grid structure by soaking the three dimensional grid structure in a slurry obtained by impregnating the activated carbon into a liquid solution containing either the photocatalyst active ingredient or a derivant of the photocatalyst active ingredient; and

steps in a step of baking the three dimensional grid structure at a temperature of 500 °C or less after the coating.

4. The method as set forth in claim 3, wherein:

the slurry is a slurry containing a material obtained through the heating process carried out at the temperature of 500 °C after the impregnating.

5. A reaction apparatus for carrying out a photocatalyst reaction, comprising:

a light source; and

the catalyst structure as set forth in claim 1,

wherein the catalyst structure has a porocity which becomes smaller as a distance from the light source is further.

[MEANS FOR SOLVING THE PROBLEMS]

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A catalyst structure of the present invention is a three dimensional grid structure whose skeleton is intricate in three-dimension, as shown in Figs. 1.

When the catalyst structure has a porocity of 75 % or greater in this case, pressure loss is small, with the result that power expense becomes small. A material of which such a three dimensional grid structure is made is selected in view of strength, and examples of the material include: (i) metals such as iron, nickel, and titanium; (ii) ceramics such as cordierite, titanic acid aluminum, and mullite; or (iii) carbons such as black lead and acetylene black. Of these materials, the ceramics and the carbons are particularly preferable. Specifically, each of these materials is porous, so that an activated carbon and a catalyst active ingredient are less likely to be removed from the base material while being supported. For this

reason, the ceramics and the carbons are preferable.

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Further, as described above, the three dimensional grid structure may be soaked in either the slurry or the liquid solution so as to be coated, and then may be baked at a temperature of 500 °C or less. For example, the three dimensional grid structure may be soaked in a slurry liquid obtained by mixing water with either (i) hydroxide of a powdered activated carbon and of a photo-catalyst active ingredient, or (ii) oxide thereof. This allows coating of the three dimensional grid structure. Thereafter, the three dimensional grid structure is baked at a temperature of 500 °C, with the result that a photocatalyst can be obtained.

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[EXAMPLES]

Example 1

While stirring 200 ml of a titanium tetrachloride liquid, 5 mol/l of ammonia water was gradually dropped in the titanium tetrachloride liquid such that the titanium tetrachloride liquid had a final pH of 8. This allowed acquirement of hydroxide titanium sediments. Then, such a titanium tetrachloride liquid was filtered. Then, 50 g of the hydroxide titanium sediments (containing 34 g of TiO_2), 113 g of powdered activated carbons each having a particle diameter of 40 μm, and 100 ml of water were

added to the titanium tetrachloride liquid thus filtered. Thereafter, the titanium tetrachloride liquid was sufficiently stirred, with the result that a slurry liquid was obtained. Then, a three dimensional grid structure whose base material is cordierite was soaked in the slurry liquid. The three dimensional grid structure has a porocity of 85 %, 50 mm-angle, and a thickness of 20 mm. The three dimensional grid structure thus soaked was dried, and was tentatively baked at a temperature of 300 °C. For acquirement of a predetermined coating amount, the slurry coating was carried out three times after the tentative baking. Thereafter, final baking was carried out for 2 hours at a temperature of 500 °C, with the result that a photocatalyst was obtained. The catalyst thus obtained has such a composition that: a total supporting amount of the activated carbons and the titanium oxide is 40 % of an entire weight of the catalyst structure, and a weight ratio of the activated carbons to the titanium oxide is 0.3.

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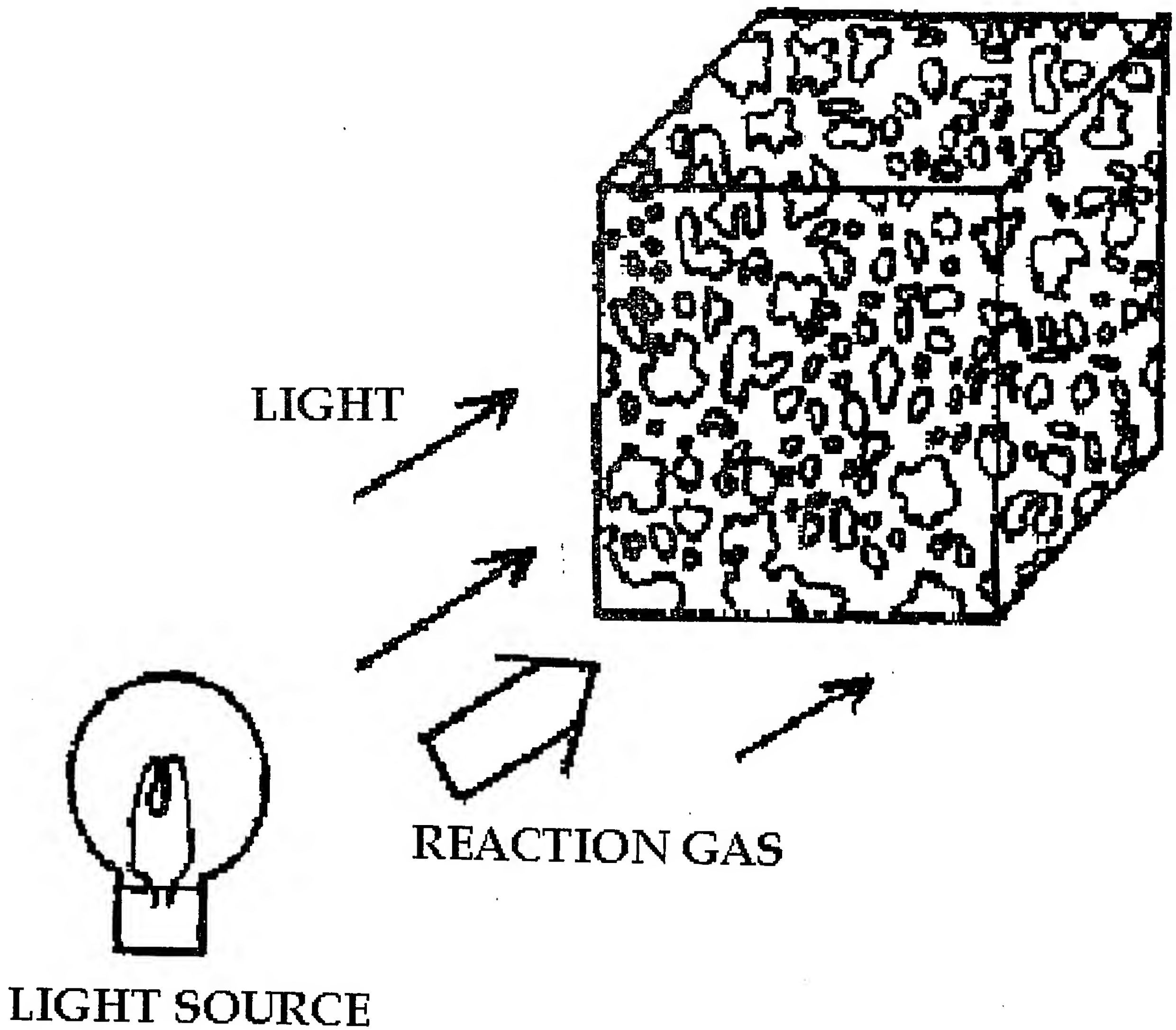
Example 8

Instead of the three dimensional grid structure made of cordierite, each of a three dimensional grid structure made of nickel and a three dimensional grid structure made of carbon was used, as the base material, for the preparation of the photocatalyst. The photocatalyst was

prepared in accordance with the method described in Example 1. The three dimensional grid structure made of nickel has a porocity of 87 %, whereas the three dimensional grid structure made of carbon has a porocity of 85 %. An extraction ratio of dimethylsulfide of each of these catalysts was measured in accordance with the method described in Example 3. The extraction ratio was 96 % in the case of using the three dimensional grid structure made of nickel, whereas the extraction ratio was 97 % in the case of using the three dimensional grid structure made of carbon. Such extraction ratios are substantially the same as the extraction ratio obtained in the case of using the three dimensional grid structure made of cordierite.

FIG. 1-1



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(54)【発明の名称】　触媒構造体及びその製造方法と装置

(57)【特許請求の範囲】

【請求項１】反応ガスを流通させると同時に光を照射して光触媒反応を行わせる触媒構造体において、該触媒構造体が、反応ガス及び光が流通可能な三次元網目構造を有し、かつ金属、セラミツクス、及びカーボンよりなる群から選択した少なくとも１種の基材に、活性炭と光触媒活性成分が担持された形態のものであることを特徴とする触媒構造体。

【請求項２】該活性炭と光触媒活性成分の合計が、触媒構造体全体に対して５～50重量%であり、活性炭に対する光触媒活性成分の重量比が、酸化物の場合に１以下、貴金属の場合に0.1以下である請求項１に記載の触媒構造体。

【請求項３】光触媒活性成分又はその誘導体を含有する溶液を活性炭に含浸させたものから得られるスラリー中に、三次元網目構造体を浸漬してコーテイングする工程、及びその後500℃以下で焼成する工程の各工程を包含することを特徴とする請求項１記載の触媒構造体の製造方法。

【請求項４】該スラリーが、該含浸後500℃以下で加熱処理して得られるもののスラリーである請求項３記載の触媒構造体の製造方法。

【請求項５】光触媒反応を実施するための反応装置が、光源と請求項１記載の触媒構造体を具備しており、かつ該触媒構造体の気孔率が、光源からの距離に対応して減少していることを特徴とする反応装置。

【発明の詳細な説明】

〔産業上の利用分野〕

本発明は、光触媒反応のために好適な触媒構造体、その製造方法及び用途に関するものであり、用途は特に、